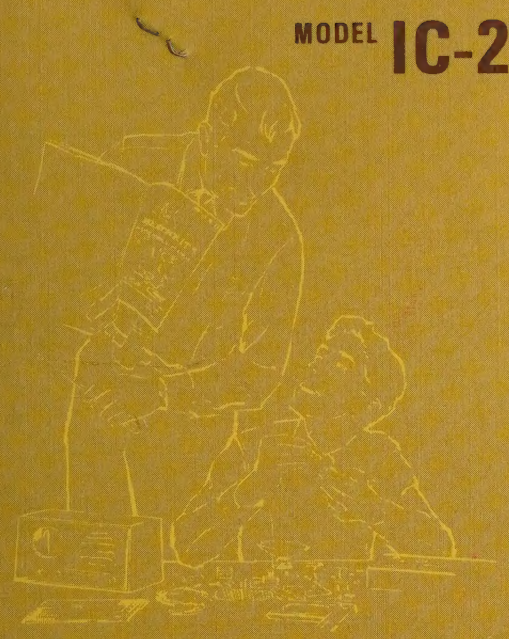
HEATH COMPANY
BENTON HARBOR, MICHIGAN



MODEL **IC-2108 Electronic Desk-Top Calculator**

HEATHKIT®

OPERATION MANUAL

HEATHKIT

Price $2.00

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I-597-1278

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HEATH COMPANY
Benton Harbor, Michigan 49022

Operation Manual
for the

HEATHKIT

MODEL IC-2108
ELECTRONIC DESK-TOP CALCULATOR

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

This Manual explains the basic operation of your Calculator. Take a few minutes to read the features and procedures so you will become familiar with your unit.

You can quickly and accurately add, subtract, multiply, and divide in an easy straightforward way. In fact you may soon use your Calculator for problems in areas you did not originally consider. Common examples and tables are provided for quick reference as you need them.

OPERATING FEATURES

Figure 1 points out the operating features of the Calculator. Each feature is described below:

1. POWER SWITCH – Turns the Calculator on and off.

2. 8-DIGIT READOUT – Displays the numbers in the calculation process. Each digit section is capable of displaying numbers 0 through 9 and a decimal point.

3. NEGATIVE NUMBER INDICATOR – Lights (–) to indicate a negative number.

4. OVERRANGE INDICATOR – Lights when the whole-number capacity of the Calculator has been exceeded. See the chart on Page 18.

5. DECIMAL POINT – Indicates the location of the decimal point in the number shown on the READOUT.

6. DECIMAL POINT SWITCH – Selects either a fixed or a floating decimal point position in the readout. The fixed position is determined when you wire the unit. The (floating) position permits the unit to automatically place the decimal point where it will include the most significant numbers. Refer to Page 21 in this Manual for further information on fixed decimal point operation.

7. (K) CONSTANT SWITCH – This switch saves steps in multiplication or division where a constant number is being used, by not requiring that the constant number be entered each time. (See Pages 10 and 11.)

8. (C) CLEAR KEY – Push this key to clear all numbers in the Calculator and reset it to zero.

9. (C_D) CLEAR DISPLAY KEY – Push this key to clear an incorrect key entry so the correct number or function can be entered. The C_D key will not disturb the result of an operation in storage or shown on the readout.

10. NUMBER ENTRY KEYBOARD – Use these keys to enter numbers into the Calculator.

11. (–) SUBTRACTION KEY – Push this key before you enter a number to be subtracted from an existing number in the Calculator.

12. (÷) DIVISION KEY – Push this key before you enter a number to be divided into an existing number in the Calculator.

13. (+) ADDITION KEY – Push this key before you enter a number to be added to an existing number in the Calculator.

14. (X) MULTIPLICATION KEY – Push this key before you enter a number to be multiplied by an existing number in the Calculator.

15. (=) EQUALS (TOTAL) KEY – Push this key to terminate a calculation and see the resulting answer on the READOUT.

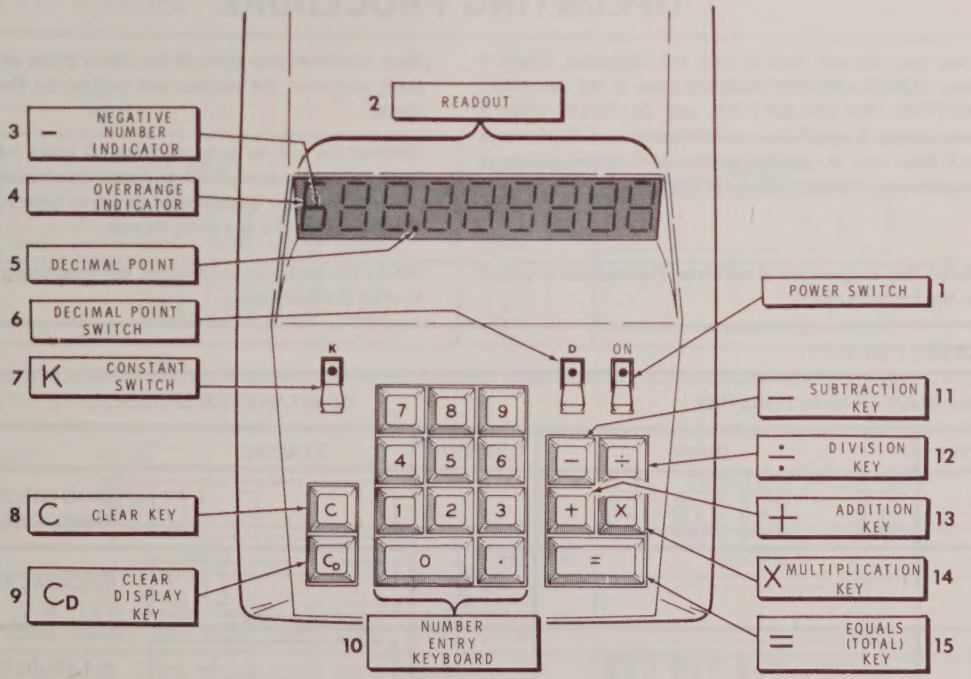

2 READOUT
3 – NEGATIVE NUMBER INDICATOR
4 OVERRANGE INDICATOR
5 DECIMAL POINT
6 DECIMAL POINT SWITCH
7 K CONSTANT SWITCH
8 C CLEAR KEY
9 C_D CLEAR DISPLAY KEY
10 NUMBER ENTRY KEYBOARD
11 – SUBTRACTION KEY
12 ÷ DIVISION KEY
13 + ADDITION KEY
14 X MULTIPLICATION KEY
15 = EQUALS (TOTAL) KEY
1 POWER SWITCH
K
D
ON
7 8 9
4 5 6
1 2 3
0 .
C
C_D
– ÷
+ X
=

Figure 1

OPERATING PROCEDURE

Charts are given to help you become familiar with the Calculator. Charts 1 through 4, which follow, illustrate the four basic functions of the Calculator: ADDITION, SUBTRACTION, MULTIPLICATION, and DIVISION. Chart 5 shows mixed calculations; Charts 6 and 7 show multiplication and division by a constant; Charts 8 and 9 show how to calculate positive and negative powers of numbers; Chart 10 shows the use of the (C_D) CLEAR DISPLAY.

A sample chart is included first to show actual readouts. The readouts in steps 1 and 3 are omitted from the function charts.

Each numbered step (line) of the Charts shows which input and function keys to push, and what the readout will be. Use the floating decimal mode for all the charts.

Connect the unit to an appropriate AC power source. This applies some power to the circuit to give instant-on operation when the Power switch is turned on. If the unit has been disconnected for some time, it may take up to 30 seconds for the display to light in a dimly lit area.

Before you begin any calculation, it is good practice to push the (C) CLEAR key to clear the Calculator.

SAMPLE CHART

READOUT CHARACTERISTICS — CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT	
1	C • 1 0		0.10	ZERO PRECEDES FRACTIONAL NUMBERS
2		+	0.1	(DECIMAL FLOATS)
3	• 5 2		0.52	(0.1 STORED)
4		=	0.62	

CHART #1 – ADDITION

ADD: 155.1 + 25.3 = 180.4

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	C 1 5 5 . 1	+	155.1
2	2 5 . 3	=	180.4

CHART # 2 – SUBTRACTION

SUBTRACT: 108.48 − 48.22 = 60.26

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	C 1 0 8 . 4 8	−	108.48
2	4 8 . 2 2	=	60.26

CHART #3 MULTIPLICATION

MULTIPLY: 225 × 3 = 675

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	C 2 2 5	X	225.
2	3	=	675.

CHART #4 – DIVISION

DIVIDE: 444 ÷ 4 = 111

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	C 4 4 4	÷	444.
2	4	=	111.

CHART #5 – MIXED CALCULATIONS IN SERIES

ADD, SUBTRACT, ADD, MULTIPLY, AND DIVIDE IN SERIES:

* $\frac{(15 + 20 - 5 + 12) \times 8}{4} = 84$

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	C 15	+	15.
2	20	−	35.
3	5	+	30.
4	12	X	42.
5	8	÷	336.
6	4	=	84.

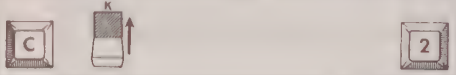
*NOTE: Addition and subtraction inside of the parenthesis must be done before the rest of the problem is worked out.

CHART #6 – MULTIPLYING BY A CONSTANT

WHERE CONSTANT K = X 3

CONSTANT SWITCH: K

2 K = 6
8 K = 24
40 K = 120

STEP	INPUT	FUNCTION	READOUT
1		X	2.
2		=	6.
3		=	24.
4		=	120.
5			

*NOTE THAT THE CONSTANT IS THE SECOND NUMBER ENTERED.

CHART #7 – DIVIDING BY A CONSTANT

WHERE CONSTANT K = ÷4

CONSTANT SWITCH: K

12 K = 3
20 K = 5
28 K = 7

STEP	INPUT	FUNCTION	READOUT
1	C, K, 1, 2	÷	12.
2	*4	=	3.
3	2, 0	=	5.
4	2, 8	=	7.
5	K		

*NOTE THAT THE CONSTANT IS THE SECOND NUMBER ENTERED.

CHART #8 – RAISING A NUMBER TO A POWER

RAISE 8 TO ITS FOURTH POWER:

$8^4 = 8 \times 8 \times 8 \times 8 = 4096$

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	C, 8	X	8.
2	8	X	64.
3	8	X	512.
4	8	=	4096.

CHART #8A RAISING A NUMBER TO A POWER USING THE CONSTANT

RAISE 8 TO ITS FOURTH POWER: **CONSTANT SWITCH: ON**

$8^4 = 8 \times 8 \times 8 \times 8 = 4096$

STEP	INPUT	FUNCTION	READOUT
1	C 8	x	8.
2		=	64.
3		=	512.
4		=	4096.

CHART #9 – CALCULATING NEGATIVE POWERS OF NUMBERS

CALCULATE: THE NEGATIVE FOURTH POWER OF 2:

CONSTANT SWITCH: OFF

$$2^{-4} = \frac{1}{2^4} = \frac{1}{2 \times 2 \times 2 \times 2} = 1 \div 2 \div 2 \div 2 \div 2 = .0625$$

STEP	INPUT	FUNCTION	READOUT
1	C 1	÷	1.
2	2	÷	0.5
3	2	÷	0.25
4	2	÷	0.125
5	2	=	0.0625

CHART #9A CALCULATING RECIPROCALS

CALCULATE: $\frac{1}{X}$

CONSTANT SWITCH: ON

X = .015625 (ON DISPLAY)

$\frac{1}{X}$ = 64

STEP	INPUT	FUNCTION	READOUT
1			0.015625
2			1.
3			64.

CHART #10 – USING THE C_D KEY TO REMOVE AN ERRONEOUS INPUT

MULTIPLY, SUBTRACT, AND DIVIDE IN SERIES:

$$* \frac{(6 \times 10) - 21}{3} = 13$$

CONSTANT SWITCH: OFF

STEP	INPUT	FUNCTION	READOUT
1	[C] [6]	[X]	6.
2	[1] [0]	[−]	60.
3	ERROR [2] [0]		− 20.
4	CLEAR DISPLAY [C_D]	** [−]	60.
5	[2] [1]	[÷]	39.
6	[3]	[=]	13.

*NOTE: The multiplication inside the parenthesis must be completed before the rest of the problem is worked out.

**NOTE: Function reentered only for subtraction.

OPERATING CONSIDERATIONS

OPERATING TEMPERATURE

The solid-state devices in the Calculator are designed to operate normally at temperatures between 10 and 40 degrees Centigrade (50 to 104 degrees Fahrenheit). If you operate the calculator in temperatures outside of this range, you may encounter inaccurate operation.

NEGATIVE NUMBERS

Negative numbers can be used in any calculations. To establish a negative number, push the (—) key immediately before you enter the number.

DECIMAL PLACES

The location of the decimal point in the answer is set by the DECIMAL POINT switch. For example, with a DECIMAL POINT setting of 0, both of the following additions would be shown on the readout as 33.

(A)		(B)	
	16		16.5963
(+)	17	(+)	17.1024
	33		33.6987

To see the full answer for addition (B), you would have to use the F (floating) setting.

In calculations where the answer, including any numbers to the right of the decimal point, exceeds eight digits, only the first eight digits of the answer will be displayed. For example, in the following addition with a DECIMAL POINT setting of 3, the READOUT would show the answer as 14206.650. If this same problem were worked out with a decimal point setting of 4, the answer would still be the same since the Calculator will not cut off the "1" at the left (most significant number) to display the "6" at the right (least significant number).

```
    6843.6919
(+) 7362.9587
   14206.6506 <------ NOT SHOWN
```

8-DIGIT DISPLAY

With a floating DECIMAL POINT setting, only the last significant digit (within the 8-digit capacity of the Calculator) to the right of the decimal point is shown. Since "5" is the last significant digit in the answer to the addition above, the answer displayed would be 14206.65.

A characteristic of the Calculator is that any fractional number is always preceded by 0 (zero) or a whole number. This characteristic limits the input and readout capacity of the Calculator to seven digits to the right of the decimal point.

OVERRANGE

The OVERRANGE INDICATOR at the left end of the READOUT will light when the whole-number interim or final answer to a calculation is beyond the 8-digit capacity of the Calculator. In an overrange condition, the part of the answer shown will be correct, but the decimal point will be eight places to the left of its correct location and the part of the answer beyond eight digits will not be shown.

To eliminate an overrange condition you must press the (C) CLEAR key.

OVERRANGE INDICATIONS CHART

EXCESS	INITIAL ENTRY	RESULT OF OPERATION	COMBINATION ENTRY AND OPERATION
Positive			
Negative			

CAUTION: As a general rule, any figure that appears in the overrange condition indicates the possibility of an error even though the display is correct.

ENDING A CALCULATION

When you have completed all inputs for a calculation, push the (=) EQUALS key. This displays the answer and prepares the Calculator for entry of the first number of the next calculation without having to push the (C) CLEAR key.

SUBTOTALING

In series calculations, you can push the (=) EQUALS key to display a subtotal. To continue with the calculation, you must push a function key (+, −, x, or ÷) before entering the next number.

TYPICAL USES

PERCENT OF A NUMBER

Just as a penny is one one-hundredth of a dollar, one percent is one one-hundredth of a unit. Therefore just as a penny ($0.01) times one hundred equals one dollar, one hundred times one percent equals one unit (100%). Divide one percent by one hundred and the result is the decimal equivalent.

Example: 1% ÷ 100% = 0.01

A 4% (.04) sales tax on a five dollar purchase would be .04 times the purchase price.

Example: $5.00 x .04 = $0.20 sales tax

The total amount of a five dollar purchase, including the tax would be $5.00 x 1.04 (one times five dollars plus .04 times five dollars).

Example: $5.00 x 1.04 = $5.20 total amount

THE PERCENT ONE NUMBER IS OF ANOTHER NUMBER

A $5.50 increase on a $110 item.

Example: $5.50 ÷ $110 = 0.05

.05 x 100% = 5%

UNIT COSTS

The cents per pound cost of an item sold as ten pounds for $0.69 would be $0.069 a pound.

Example: $ .69 ÷ 10 = $0.069 for one pound.

A dozen (12) items at $0.60 would be $0.05 each.

Example: $0.60 ÷ 12 = $0.05 each.

A car travels 360 miles and requires 20 gallons of gas, a gallon for every 18 miles or $0.02 a mile at $0.36 per gallon.

Example: 360 ÷ 20 = 18 miles per gallon

$0.36 ÷ 18 = $0.02 cost per mile for gas

FRACTION TO DECIMAL

One sixteenth of an inch equals .0625 of an inch.

Example: 1 ÷ 16 = 0.0625

SQUARE AREA

A rug 13 feet 7 inches by 14 feet 7 inches equals 198.09 square feet or 22.01 square yards (9 square feet equal one square yard).

Example: First convert 7 inches to a decimal figure.

$7 \div 12 = .5833$ feet

then multiply

$13.5833 \times 14.5833 = 198.09$ square feet

or

$198.09 \div 9 = 22.01$ square yards

RAISING A NUMBER TO A POWER

A number multiplied by itself will give the square of the number or the second power of the number. The square of the number multiplied by the number will give the cube or the third power of the number, and so on:

Example: $15 \times 15 = 225 = (15^2)$

$15 \times 15 \times 15 = 3375 = (15^3)$

SQUARE ROOT OF A NUMBER (trial and error)

This calculator does not provide a single step method to determine the square root of all numbers. However, with the following formula the square root of any number can be determined in about four steps.

Let N represent the number, and A will be your first rough estimate for the square root. In the example above, 15 is the square root of 225, and a good estimate if we use 226 for N. Substitute the numbers in the formula below and the result of step 1 will be a closer estimate number to substitute for A in step 2. Then repeat the process. For step 3, substitute the result of step 2 for A, and so on, until the number (N) divided by A equals A to the required tolerance.

Example: N = 226, A = 15 in the formula $\dfrac{\frac{N}{A} + A}{2}$

Step 1. $226 \div 15 + 15 \div 2 = 15.033333$

Step 2. $226 \div 15.033333 + 15.033333 \div 2 = 15.033296$

Step 3. $226 \div 15.033296 + 15.033296 \div 2 = 15.033296$

Check: $15.033296 \times 15.033296 = 225.99998$

FIXED DECIMAL

This Calculator offers the option of operating with a floating or fixed decimal point position. The Calculator operates in the fixed decimal mode when the Decimal switch is in the "D" position (see Figure 1 on Page 5).

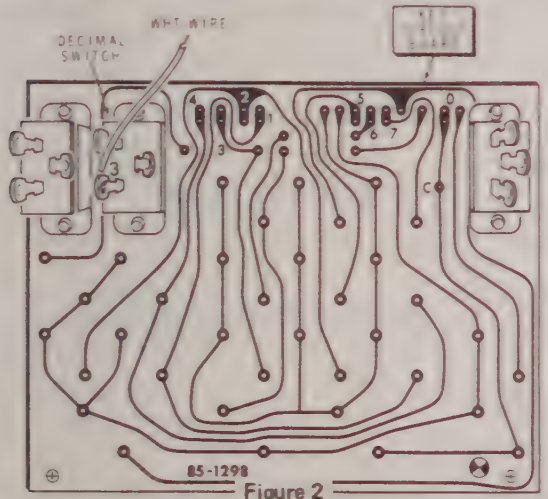


Figure 2

Selection of the fixed decimal position is made by connecting the wire coming from lug 3 of the Decimal switch (see Figure 2) to one of the numbered holes on the foil side of the key circuit board. (This wire was connected to one of these holes during assembly.) If you should decide that you want to change the fixed decimal position, remove the cabinet and then remove the two screws from the lower edge of the key circuit board and lift the board enough to reach this foil area.

The numbered holes on the circuit board correspond to their fixed decimal position. For example, if you connect the wire to hole 1, you would have a fixed decimal in the first place (0000000.0). If you connect the wire to hole 5, you would have a fixed decimal in the fifth place (00000000).

Whatever fixed decimal position you choose, it will not affect the use of the decimal when the Decimal switch is in the floating position. Some applicable uses of fixed decimal positions are as follows:

DECIMAL POSITION	USE
0	Rounding off fractions to whole numbers.
1	Indicates tenths.
2	For figuring dollars and cents.
3	For figuring thousanths or tenths of cents.
4	Answer displayed to 1/10,000
5	Answer displayed to 1/100,000
6	Answer displayed to 1/1,000,000
7	Answer displayed to 1/10,000,000

REFERENCE TABLES

The following tables are included as a guide for some of the many applications of your Calculator.

LIQUID OR FLUID MEASURE

4 ounces (oz.)	= 1 gill
2 gills	= 1 cup
2 cups	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)
31-1/2 gallons	= 1 barrel (bbl.)
2 barrels	= 1 hogshead (hhd.)

METRIC EQUIVALENTS, LIQUID OR FLUID MEASURE

	Dry	Liquid
1 centiliter (cl)	= .6102 cu. in.	= .338 oz.
1 deciliter (dl) (10 cl)	= 6.102 cu. in.	= .845 gill
1 liter (l) (10 dl)	= .908 qt.	= 1.0567 qt.
1 decaliter (dcl) (10 l)	= 9.08 qt.	= 2.64 gal.

DRY MEASURE

2 pints	= 1 quart
8 quarts	= 1 peck
4 pecks	= 1 bushel (bu.)

MEASURES OF WEIGHT

Avoirdupois

16 drams	= 437.5 grains = 1 ounce (oz.)
16 ounces	= 7000 grains = 1 pound (lb.)
100 pounds	= 1 cental = 1 hundredweight (cwt.)
2000 pounds	= 1 short ton (T.)
2240 pounds	= 1 long ton or gross ton

Also (in Great Britain)

14 pounds	= 1 stone
2 stones	= 1 quarter
4 quarters	= 112 lb. = 1 hundredweight
20 hundredweight	= 1 long ton

Reference Tables (Cont'd.)

Troy (Precious Metals)

24 grains	= 1 pennyweight (dwt.)
20 pennyweights	= 480 grains = 1 ounce
12 ounces	= 5760 grains = 1 pound

NAUTICAL MEASURE

6,080 feet	= 1 nautical mile
6 feet	= 1 fathom
120 fathoms	= 1 cable length
1 nautical mile per hour	= 1 knot of speed

SURVEYORS' MEASURE

7.92 inches	= 1 link
25 links	= 1 rod
100 links	= 66 ft. = 1 chain
80 chains	= 1 mile

COMMON EQUIVALENTS (approximate)

1 bushel	= 2150 cubic inches or 1-1/4 cubic feet
1 gallon	= 231 cubic inches
1 cubic foot	= 7-1/2 gallons
1 cubic foot of water	= 62-1/2 pounds
1 gallon of water	= 8-1/3 pounds
1 cubic foot of ice	= 57-1/2 pounds
1 barrel (bbl.) flour	= 196 pounds
1 ton hay	= 500 cubic feet
1 ton hard coal	= 35 cubic feet
1 ton soft coal	= 42 cubic feet

WEIGHT OF WATER

1 cubic inch	.0360 pound
12 cubic inches	.433 pound
1 cubic foot	62.3 pounds
1 cubic foot	7.48052 U.S. gallons
1.8 cubic feet	112.0 pounds
35.96 cubic feet	2240.0 pounds
1 Imperial gallon	10.0 pounds
11.2 Imperial gallons	112.0 pounds
224 Imperial gallons	2240.0 pounds
1 U.S. gallon	8.33 pounds
13.45 U.S. gallons	112.0 pounds
269.0 U.S. gallons	2240.0 pounds

Reference Tables (Cont'd.)

COMMON KITCHEN MEASUREMENTS

STANDARD	EQUIVALENT
One pinch or dash	= 1/16 teaspoon
3 teaspoons	= 1 tablespoon (1/2 ounce liquid)
4 tablespoons	= 1/4 cup (2 ounces liquid)
1/3 cup	= 5 tablespoons plus 1 teaspoon
1/2 cup	= 8 tablespoons (4 ounces liquid)
1 gill	= 1/2 cup (4 ounces liquid)
1 cup	= 16 tablespoons (8 ounces liquid)
2 cups	= 1 pint (16 ounces liquid)
2 pints	= 1 quart (32 ounces liquid)
4 quarts	= 1 gallon
8 quarts	= 1 peck
4 pecks	= 1 bushel
16 ounces	= 1 pound (dry measure)

NOTE: All measurements quoted are level.

COUNTING

12 units	1 dozen (doz.)
12 dozen or 144 units	= 1 gross (gr.)

LINEAR MEASURE

12 inches	= 1 foot
4 inches	= 1/3 (4/12) foot= 1 hand
9 inches	= 1 span
3 feet	= 1 yard
5-1/2 yards	= 16-1/2 feet = 1 rod, pole or perch
40 poles	= 220 yards = 1 furlong
8 furlongs	= 1,760 yards = 5,280 feet = 1 mile
3 miles	= 1 league
69-1/8 miles	= 1 degree
320 rods	= 1 mile

SQUARE OR AREA MEASURE

144 square inches	= 1 square foot
9 square feet	= 1 square yard
30-1/4 square yards	= 1 square rod, pole or perch
160 square rods	= 1 acre
10 square chains	= 43,560 sq. ft. = 1 acre

640 acres = 1 square mile = 1 "section" of U.S. Government surveyed land

Reference Tables (Cont'd.)

CUBIC OR VOLUME MEASURE

1,728 cubic inches . . . . . = 1 cubic foot
27 cubic feet . . . . . = 1 cubic yard
1 cord of wood . . . . . = 128 cubic feet
1 board foot = 144 cubic inches . . . . . = 1/12 cubic foot
1 perch of stone or brick . . . . . = 24-3/4 cubic feet
(May vary from 16-1/2 to 25 cubic feet)

Number of board feet in a log = $[1/4\ (d-4)]^2 L$; where "d" = diameter of log (taken inside the bark at the small end) in inches; and L = length of log in feet. The 4 inches subtracted are an allowance for slab. Remember to square the formula before multiplying by the length.

ANGLES AND ARCS

60 seconds (") . . . . . = 1 minute (')
60 minutes . . . . . = 1 degree (°)
90 degrees . . . . . = 1 right angle
360 degrees of arc (circle) . . . . . = 1 circumference
360 degrees of angle . . . . . = 1 complete rotation

METRIC EQUIVALENTS

Linear

1 millimeter (mm) . . . . . = .0394 in.
1 centimeter (cm) . . . . . = .3937 in.
1 decimeter (dm) . . . . . = 3.937 in.
1 meter (m) . . . . . = 39.37 in. = 1.1 yd.
1 decameter . . . . . = 393.7 in. = 10 yd. 2.8 ft.
1 hectometer . . . . . = 328 ft. 1 in.
1 kilometer . . . . . = 3,280 ft. 1 in.

Square

1 square millimeter . . . . . = .00155 sq. in.
1 square centimeter . . . . . = .155 sq. in.
1 square meter . . . . . = 10.764 sq. ft. or 1.196 sq. yd.
1 square kilometer . . . . . = .3861 sq. mile
1 are . . . . . = 100 sq. meters = 119.6 sq. yd.
= basic unit in measuring land

Cubic

1 cubic millimeter . . . . . = .000061 cubic inches
1 cubic centimeter . . . . . = .0610 cubic inches
1 cubic meter . . . . . = 35.314 cubic feet = 1.3079 cubic yards

CONVERTING INCHES AND FRACTIONS OF AN INCH TO DECIMALS OF A FOOT

Inches	1	2	3	4	5	6	7	8	9
Feet	.0833	.1667	.25	.333	.4167	.5	.5833	.667	.75
Inches	10	11	1/8	1/4	3/8	1/2	5/8	3/4	7/8
Feet	.833	.9167	.0104	.0208	.0313	.0417	.0521	.0625	.0729

DECIMAL EQUIVALENTS OF COMMON FRACTIONS

1/2	.5000	1/32	.0313	3/11	.2727	6/11	.5455
1/3	.3333	1/64	.0156	4/5	.8000	7/8	.8750
1/4	.2500	2/3	.6667	4/7	.5714	7/9	.7778
1/5	.2000	2/5	.4000	4/9	.4444	7/10	.7000
1/6	.1667	2/7	.2857	4/11	.3636	7/11	.6364
1/7	.1429	2/9	.2222	5/6	.8333	7/12	.5833
1/8	.1250	2/11	.1818	5/7	.7143	8/9	.8889
1/9	.1111	3/4	.7500	5/8	.6250	8/11	.7273
1/10	.1000	3/5	.6000	5/9	.5556	9/10	.9000
1/11	.0909	3/7	.4286	5/11	.4545	9/11	.8182
1/12	.0833	3/8	.3750	5/12	.4167	10/11	.9091
1/16	.0625	3/10	.3000	6/7	.8571	11/12	.9167

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